

What we claim is:

1. A method for testing a stent for a prosthetic valve, the method comprising applying fluid pressure against a stented test structure in a backward direction with the stented test structure substantially blocking the flow of the fluid, the stented test structure comprising
5 a stent and a flexible membrane extending within the lumen defined by the stent, wherein the flexible membrane does not fully open upon application of fluid pressure in a forward direction.

2. The method of claim 1 wherein the fluid is a liquid.

3. The method of claim 1 wherein the fluid is saline.

4. The method of claim 1 wherein the fluid pressure has a peak over a cycle from about 60 mmHg to about 200 mmHg.

5. The method of claim 1 wherein the commissure posts deflect inward approximately an equivalent amount as the commissure posts deflect in a corresponding valve when subjected to a pulse duplicator at a physiological condition.

6. The method of claim 1 wherein the fluid pressure is cyclic.

7. The method of claim 6 wherein the cyclic fluid pressure is approximately periodic.

8. The method of claim 7 wherein the periodic fluid pressure has a frequency from about 1000 to about 6000 cycles per minute.

9. The method of claim 1 wherein the stented test structure is mounted within a conduit.

10. The method of claim 9 wherein the conduit is connected to a cyclic pressure applicator.

11. The method of claim 1 wherein the flexible membrane comprises a polymer.

12. The method of claim 11 wherein the polymer comprises polyurethane or silicone.

13. The method of claim 11 wherein the polymer is cast around the stent to form an integral unit.

14. The method of claim 1 wherein the flexible membrane comprises a tissue.

15. The method of claim 1 wherein the flexible membrane opens upon application of the fluid pressure in the forward direction no more than about 80 percent of the full open lumen at the edge of the stent corresponding to the inflow edge of the prosthesis.

16. The method of claim 1 wherein the flexible membrane opens upon application of the fluid pressure in the forward direction from about 1 percent and about 60 percent of the full open lumen at the edge of the stent corresponding to the inflow edge of the prosthesis.

17. The method of claim 1 wherein the flexible membrane opens upon application of the fluid pressure in the forward direction from about 5 percent to about 30 percent of the full open lumen at the edge of the stent corresponding to the inflow edge of the prosthesis.

18. The method of claim 1 wherein the flexible membrane forms a seal against flow in any direction through the stented test structure.

19. The method of claim 1 wherein the stent comprises a plurality of commissure posts and scallops extending between the commissure posts, and wherein the flexible membrane has a plurality of contours connecting to the stent along the scallops.

20. The method of claim 19 wherein the flexible membrane is at least partly sealed along edges between contours to restrict flow through the membrane.

21. The method of claim 19 wherein the stent has three commissure posts.

22. The method of claim 19 wherein at least one contour comprises a one way portal that provides flow upon application of fluid pressure in the forward direction and closes against fluid pressure in a backward direction.

23. A testing apparatus comprising a cyclic pressure applicator, a conduit connected to the pressure applicator, and a stented test structure mounted within the conduit to receive cyclic fluid pressures from the pressure applicator, the stented test structure comprising a stent and a flexible membrane extending within the lumen defined by the stent, wherein the flexible membrane substantially blocks flow of the fluid in a backward direction and does not fully open in response to fluid pressure in a forward direction.

24. The testing apparatus of claim 23 wherein the cyclic pressure applicator cycles the fluid pressures at a frequency from about 1500 to about 6000 cycles per minute.

25. The testing apparatus of claim 23 wherein the flexible membrane comprises polymer cast around the stent to form an integral unit.

26. The testing apparatus of claim 23 wherein the flexible membrane opens upon application of the fluid pressure in the forward direction no more than about 80 percent of the full open lumen at the edge of the stent corresponding to the inflow edge of the prosthesis.

27. The testing apparatus of claim 23 wherein the flexible membrane opens upon application of the fluid pressure in the forward direction from about 5 percent and about 30 percent of the full open lumen at the edge of the stent corresponding to the inflow edge of the prosthesis.

28. The testing apparatus of claim 23 wherein the flexible membrane forms a seal against flow in any direction through the stented test structure.

29. A stented test structure comprising a stent and a flexible membrane extending within the lumen defined by the stent, wherein the stent comprises a plurality of commissure posts and scallops extending between the commissure posts, and wherein the flexible membrane connects to the stent along the scallops and opens no more than about 80 percent of the full open lumen at the edge of the stent corresponding to the inflow edge of the prosthesis upon application of fluid pressure in a forward direction.